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USE OF ENGINES MANUFACTURED BY SE "ZORYA"-"MASHPROEKT" GTR&PC FOR RENOVATION OF THE GAS TRANSPORTATION SYSTEM OF "UKRTRANSGAZ" PJSC

The article observes potential participation of SE "Zorya"-"Mashproekt" GTR&PC in implementation of the program for renovation of Ukraine's gas transportation system facilities. The mentioned state enterprise, as an originator of the method of compressor stations renovation by means of a heavy upgrading of gas pumping units, has a long experience of successful implementation of tens of such projects in the Russian Federation, Ukraine, Bulgaria. The examples and propositions for modernization of gas pipe-lines of "Ukrtransgaz" PJSC gas transportation sys-tem are set forth in the article.

Key words: modernization, gas transportation system, gas pipeline, compressor station, renovation, gas pumping equipment.

Introduction. The condition of gas pumping units being currently exploited in Ukraine's gas transportation system is characterized by a sizable proportion of GPUs driven by outdated gas turbines having low efficiency.

One of the main line of activity of the State Enterprise "Zorya"-"Mashproekt" Gas Turbine Research and Production Complex (SE "Zorya"-"Mashproekt" GTR&PC) is development and manufacturing of gas turbine engines for the needs of gas transportation system (both for new GPUs and renovation of used ones).

Problem. The necessity of renovation of existing compressor stations of "Ukrtransgaz" PJSC gas transportation system (GTS) or construction of new ones is determined by:

- requirements to decreasing of gas consumption for own needs (GPU fuel gas);
- condition of the available fleet of gas pumping units (degree of the physical and functional depreciation);
- requirements to the improvement of reliability of gas pumping units and stability of operation of the gas transportation system;
- problems on maintenance and increasing of transportation, including transit, of gas, to solve by "Ukrtransgaz" PJSC;
- requirements to decreasing of harmful effect on the environment.

Due to the significant amount of gas pumping units manufactured by non-Ukrainian enterprises, it is difficult to perform their service maintenance and high-quality repair of the equipment. The cost of repair and spare parts is unreasonably high.

Objectives. Participation of SE "Zorya"-"Mashproekt" GTR&PC in implementation of the program of renovation of strategic objects of the gas transportation system of Ukraine is possible on the following lines envisaged by the plan:

a) modernization and renovation of compressor stations in the systems mentioned below:

- Western Transit Corridor ("Soyuz", "Urengoy-Pomary-Uzhhorod", "Prohres" gas pipelines);
- South Transit Corridor ("Yelets-Kremenchuk-Kryvyi Rih", "Kremenchuk-Ananiiv-Bohorodchany", "Ananiiv-Tiraspol-Izmail" gas pipelines);

b) modernization and renovation of the following underground storage fields:

- "Bil'che-Volytsia-Uherske";
- "Bohorodchany".

Methods and Results. Ukraine has at its disposal enterprises being capable of covering all the requirements of high-efficiency domestic gas pumping equipment that corresponds to the modern and long-range technical demands and level.

Specialists of the State Enterprise "Zorya"-"Mashproekt" Gas Turbine Research and Production Complex have developed a variety of types and modifications of the 3rd and 4th generation gas turbine engines. Their power output and rotation speed allows for using them with any types of gas compressors operated in the gas transportation system of Ukraine, as well as new gas compressors manufactured by PJSC "Sumy Frunze Machine-Building Science and Production Association" (PJSC "Sumy Frunze NPO") being offered for renovation of the compressor stations. Fuel efficiency of these engines (efficiency in simple cycle comes to 31–36,5% and in combined cycles – to 41-43%) makes it possible to provide a total decrease of fuel gas consumption by more than 1.2 billion m^3/year when putting them into service in the gas transportation system.

Presently, in addition to SE "Zorya"-"Mashproekt GTR&PC, the following companies are present in the market of gas turbine units rated at 6.3-25 MW being used as a drive of gas pumping units:

- OJSC "Aviadvigatel" (the Russian Federation);
- OJSC "Perm Engine Company" (the Russian Federation);
- OJSC "NPO Saturn" (the Russian Federation);
- JSC "Kuznetsov" (the Russian Federation);
- Motor Sich, JSC (Ukraine);
-"General Electric" (USA);
- "Solar" (USA);
- "Siemens" (Germany);
- "Rolls-Royce" (the United Kingdom);
- "Pratt&Whitney" (USA);
- "Kawasaki" (Japan);
- "Hitachi" (Japan);
- "MAN Turbo" (Germany).

The economical operation criteria of SE "Zorya"-"Mashproekt" GTR&PC's engines correspond to the level of advanced world analogues in the relevant power categories.

The high level of SE "Zorya"-"Mashproekt" GTR&PC's engines reliability that leave behind the performance of foreign drives is supported by statistical data on reliability rates of gas turbine drives of different types exploited in the GTS of OAO "Gazprom" as reported by DOAO "Orgenergogaz".

SE "Zorya"-"Mashproekt" GTR&PC offers the following gas turbine engines (gas turbine drives) that are used or can be used in new and modern gas pumping units of PJSC "Sumy Frunze NPO":

UGT 6000: DT71P with a rated power at GPU conditions of 6.3 MW, design rotation speed of power turbine rotor of 8200 rpm, clockwise direction of rotation;

UGT 8000: DT70P with a rated power at GPU conditions of 8 MW, design rotation speed of power turbine rotor of 8200 rpm, clockwise direction of rotation;

UGT 15000: DG90L2.1 with a rated power at GPU conditions of 16 MW, design rotation speed of power turbine rotor of 5200 rpm, anticlockwise direction of rotation;

DG90P2(L2) with a rated power at GPU conditions of 16 MW, design rotation speed of power turbine rotor of 5200 rpm, bidirectional rotation;

DI90P rated at 14 MW (in the developmental stage), design rotation speed of power turbine rotor of 6500 rpm, clockwise direction of rotation;

UGT 25000: DN80L1.1 with a rated power at GPU conditions of 25 MW, design rotation speed of power turbine rotor of 3700 rpm, anticlockwise direction of rotation;

DU80L1 with a rated power at GPU conditions of 25 MW, design rotation speed of power turbine rotor of 5000 rpm, anticlockwise direction of rotation;

DI80L1 with a rated power at GPU conditions of 25 MW, design rotation speed of power turbine rotor of 4800 rpm, clockwise direction of rotation.

The above-recommended types and modifications of engines allow for using them in gas turbine units of co-generation design with an additional generation of thermal energy in the form of steam or hot water and are capable to ensure:

- heavy modernization of the gas turbine gas pumping units (GTUs) being operated at the strategic objects of the GTS of Ukraine;
- introduction of new gas pumping units with gas turbine drives.

When it is necessary to construct new compressor departments, GPUs of PJSC "Sumy Frunze NPO" with modern drives manufactured by SE "Zorya"-"Mashproekt" GTR&PC can be used.

SE "Zorya"-"Mashproekt" GTR&PC provides (without necessity to cross the customs border of Ukraine):

- design supervision of supplied equipment in the field;
- technical supervision during erection and commissioning of the equipment;
- warranty and post-warranty service during the whole service life of the equipment,
- optimum modernization of the equipment which have gone through its service life,
- training of maintenance personnel of the compressor stations and enterprises of "Ukrtransgaz" PJSC.

Conclusion. SE "Zorya"–"Mashproekt" GTR&PC offers a range of types and modifications of advanced high-efficiency gas turbine engines, application of which is implied by the innovative method of compressor stations renovation with gas pumping units heavy upgrading.

Use of domestic gas turbine drives conforming to the modern world level as a part of domestic gas pumping units when modernizing compressor stations of the GTS of Ukraine will permit:

- to load the domestic enterprises of machine-building and metallurgical complex producing innovative and competitive products;

- to obtain going of significant funds in the form of taxes and payments into the budget of Ukraine;

- to provide technical support of “Ukrtransgaz” PJSC gas transportation companies and to ensure stabile operation of the GTS throughout the equipment life cycle.

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ПРОЕКТНО ОРИЕНТИРОВАННАЯ НАПРАВЛЕННОСТЬ ПРОЦЕССОВ УПРАВЛЕНИЯ ИНВЕСТИЦИОННЫМИ КОМПАНИЯМИ НА ВАЛЮТНОМ РЫНКЕ

В данном исследовании рассмотрены инвестиционные компании, работающие на рынке Forex. Анализ бизнес-процессов показал проектную направленность их деятельности. Выделенные две группы проектов инвестиционных компаний позволяет позиционировать их как проектно-ориентированные организации.

Ключевые слова: проектная деятельность, форекс, инвестиционная компания, валютный рынок.

Введение. Обычно деятельность инвестиционных компаний характеризуется как операционная. Однако это показало свою неэффективность в современных условиях. В данном исследовании под инвестиционной компанией будем понимать финансовые организации, участников финансовых рынков. Сегментация этого рынка положена в основу критерия определенных типов инвестиционных компаний.

Современные инвестиционные компании предоставляют возможность торговли на рынках: нефти, акций, фьючерсов, индексов, золота, форекса (валютный рынок) [1]. В данной статье рассмотрен сегмент услуг связанный с валютным рынком форекс.

Анализ последних исследований и литературы. Проведенный анализ, первичной литературы, показал отсутствие информации об инвестиционных компаниях как проектно ориентированных организациях.

Проектно – ориентированные организации имеют разнообразную форму, предполагая создание временных систем для реализации проектных задач или услуг[2].